REMARKS

The present application was filed on June 16, 2000 with claims 1 through 24. Claim 4 was canceled in a previous response. Consequently, claims 1-3 and 5-24 are presently pending in the above-identified patent application. The present amendment

5   amends claim 10 to fix an error of a grammatical nature.

In the outstanding Office Action, the Examiner (1) rejected claim 10 under 35 USC §112, (2) rejected claims 1-3, 5, 7, 11, 15, 16, 19, and 22-24 under 35 USC §102(e), (3) rejected claims 6, 8-10, 17, 18, and 21 under 35 USC §103(a), and (4) objected to dependent claims 12-14 as being dependent upon a rejected base claim, but

10   indicated that these claims would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Rejection of Claim 10 Under 35 USC §112

The Examiner rejected claim 10 under 35 USC §112, second paragraph, as

15   being indefinite for failing to point out and distinctly claim the subject matter which applicant regards as the invention. In particular, the Examiner asserted that "[i]t seems that Applicant is comparing the first digital representation of claim 9 with the first digital representation of claim 10, which is not clear to the examiner."

Applicants respectfully submit that dependent claim 10 met the

20   requirements of 35 USC §112 as filed. In independent claim 1, characteristics of a used are converted into a first digital representation, and the first digital representation is distorted into a distorted digital representation. Dependent claim 9, which depends from independent claim 1, has the limitation of "where the first digital representation is quantized at a particular level." Amended dependent claim 10, which depends from

25   dependent claim 9, contains the limitation of "where the distorted digital representation has a larger range relative to a range of the first digital representation."

Thus, dependent claim 9 indicates that the first digital representation is quantized. Dependent claim 10 indicates that a range of the distorted digital representation is larger than a range of the first digital representation. This is shown in

30   FIG. 13 and described from page 33, line 20 to page 14, line 12 of Applicants' specification. FIG. 13 shows an example of a first digital representation having a point

set 1300 (see top portion of FIG. 13) that is converted to a point set 1360 by a distortion process. Data (corresponding to a first representation) in point set 1300 can range between 0 and 511 for each of the x and y axes. By contrast, data (corresponding to a distorted digital representation) in the point set 1360 can range between 0 and 1023 for each of the x and y axes. Thus, FIG. 13 shows that the distorted digital representation has a range that is larger than the range of the first digital representation, as claimed in dependent claim 10.

Because Applicants claim 10 clearly claims an example described in Applicants' specification, dependent claim 10 meets the requirements of 35 USC §112, and Applicants respectfully request the §112 rejection to dependent claim 10 be withdrawn.

Rejection to Claims Under 35 USC §102(e)

The Examiner rejected claims 1-3, 5, 7, 11, 15, 16, 19, and 22-24 under 35 USC §102(e) as being anticipated by Hsu et al., U.S. Patent No. 6,134,340 (hereinafter, Hsu). The Examiner points to FIG. 1 and element 12 of Hsu as meeting the limitations of distorting a first digital representation into a distorted digital representation by distorting at least one of subcharacteristic of a biometric, the distortion process being repeatable and non-invertible, as in independent claims 1 and 22-24.

Applicants respectfully disagree. Element 12 of Hsu is an image preprocessor and performs the steps shown in FIG. 7. See col. 1, lines 49-59 of Hsu. FIG. 7 of Hsu describes certain steps taken by the image preprocessor 12 of Hsu. These steps include rotating a fingerprint (step 34), performing adaptive binarization of the print image (step 36) and cropping the image (step 38). Even if one or more of these steps are interpreted to meet the limitation of distorting a first digital representation of one or more biometrics into a distorted digital representation by distorting at least one subcharacteristic of the biometric as claimed in independent claims 1 and 22-24, Hsu does not disclose at least the limitation of "the distortion process being repeatable and non-invertible."

Applicants state the following at page 14, lines 11-19:

> The present invention introduces cancelable biometrics. Unlike traditional biometrics, these biometrics can be changed when somehow compromised. A cancelable biometrics is a transformation of the biometrics which result in a intentional distorted representation of the same format as the original biometrics. This distortion is repeatable in the sense that, irrespective of variations in recording conditions of the original biometric, it generates the same (or very similar) distorted biometric each time. If the distortion is constructed to be non-invertible then the original biometric can never be derived from the cancelable biometric, thus ensuring extra privacy for the user.

Thus, a distortion process that is non-invertible means that the first digital representation cannot be derived from the distorted digital representation.

In Hsu, the output of the method of FIG. 7 is simply a binary image of the fingerprint. ("Finally, as indicated in block 40, a binary image of the fingerprint is ready for output to either the enrollment process or the verification process." See Hsu at col. 8, lines 54-56.) By contrast, Applicants invention increases privacy of the user by creating a distorted digital representation, where the process of distorting is repeatable and non-invertible. Applicants can find no process in Hsu that distorts a first digital representation of one or more biometrics into a distorted digital representation by distorting at least one subcharacteristic of the biometric, where the distortion process is repeatable and non-invertible, as claimed by Applicants in independent claims 1 and 22-24.

Consequently, Applicants respectfully submit that independent claims 1 and 22-24 are patentable over Hsu. Because independent claim 1 is patentable, its dependent claims 2, 3, 5, 7, 11, 15, 16, 19, 20 are patentable for at least the reasons given above. Applicants therefore request the §102(e) rejection to claims 1-3, 5, 7, 11, 15, 16, 19, and 22-24 be withdrawn.

Rejection of Claims Under 35 USC 103(a)

The Examiner rejected claims 6, 8-10, 17, 18, and 21 under 35 USC §103(a). Each of the claims 6, 8-10, 17, 18, and 21 is dependent on independent claim 1, and therefore each of the claims is patentable for at least the reasons given above.

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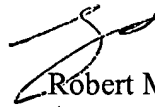Applicants respectfully request the §103(a) rejection to claims 6, 8-10, 17, 18, and 21 be withdrawn.

Conclusion

All of the pending claims, i.e., claims 1-3 and 5-24, are in condition for allowance and such favorable action is earnestly solicited.

If any outstanding issues remain, or if the Examiner has any further suggestions for expediting allowance of this application, the Examiner is invited to contact the undersigned at the telephone number indicated below.

The Examiner's attention to this matter is appreciated.

Respectfully submitted,

Date: August 13, 2004

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